

# Multi-functional Optical Subsystem Enabling Laser Communication on Small Satellites, Phase I

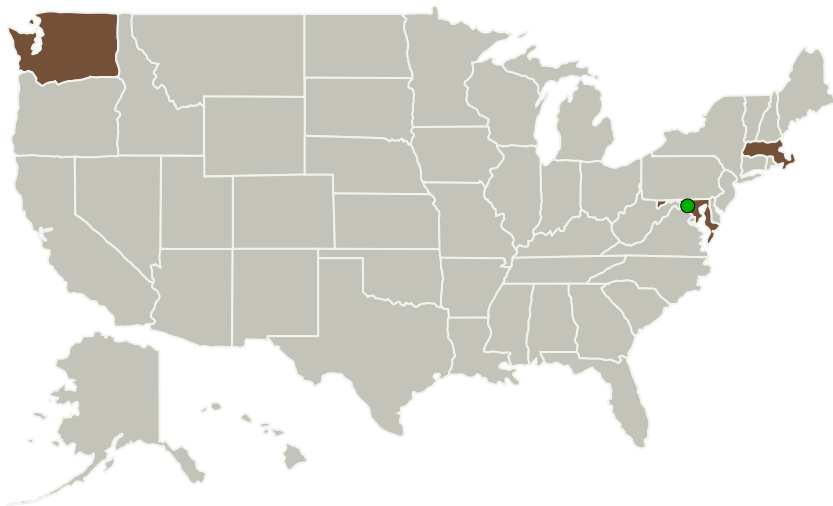
Completed Technology Project (2012 - 2013)



## Project Introduction

Advancements in technology and contractions in budgets are driving constant increases in spacecraft "capability density." These factors are motivating the design of small spacecraft capable of generating and communicating large amounts of data, over great distances, at low cost. Arkyd Astronautics is a provider of robotic space exploration services and is developing microspacecraft to conduct low cost deep-space missions. Arkyd is currently developing the technology required for implementing small satellite optical communication as a key enabler of our commercial business model. Arkyd proposes to determine the feasibility of developing a novel multi-functional optical subsystem used for attitude determination, stability control, scientific observation and high-precision optical communication on small satellites. If successful, the proposed optical subsystem design will result in small satellite attitude control and communication performance improvements of several orders of magnitude over the current state-of-the-art. The proposed effort will leverage technology under development for the MIT/Draper Lab ExoplanetSat to design a TRL 4 system demonstrator capable of sub-arcsecond pointing stability by the completion of Phase I work. Phase II follow-on work will focus on fabrication, assembly, and system testing of a demonstrator for the proposed system. It is the expectation of the proposing team to achieve TRL 6 by the end of Phase II work.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Planetary Resources Development Corporation	Lead Organization	Industry	Bellevue, Washington
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland
Massachusetts Institute of Technology(MIT)	Supporting Organization	Academia	Cambridge, Massachusetts

## Primary U.S. Work Locations

Maryland	Massachusetts
Washington	

## Project Transitions

**February 2012:** Project Start**February 2013:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138332>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Planetary Resources Development Corporation

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Chris Lewicki

**Co-Investigator:**

Chris Lewicki

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## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



## Technology Areas

### Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - └ TX05.1 Optical Communications
    - └ TX05.1.6 Optometrics

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System